

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

MAR 23 1979

DATE: ACTION MEMORANDUM-Notice of Application to Construct
and Preliminary Determination, Prudhoe Bay Unit (PBU)
SUBJECT: Prudhoe Bay, Alaska
FROM: *HEA*
Lloyd A. Reed, Director
Enforcement Division M/S 517
TO: Donald P. Dubois
Regional Administrator

BACKGROUND

On December 6, 1978, EPA received from the Atlantic Richfield Company and the SOHIO Petroleum Company a complete PSD permit application requesting approval to add eleven gas turbines at the Prudhoe Bay oil field.

The information submitted underwent technical review by the Surveillance and Analysis Division staff. This review was performed to ensure that (1) the Company proposed to use the best available control technology (BACT) or, if not, that BACT limits would be specified as a condition of approval, and (2) the proposed addition would not result in either the PSD increment or ambient air quality standards being exceeded.

DISCUSSION

This project is subject to PSD review for emissions of nitrogen oxides (NO_x), hydrocarbons (HC), and carbon monoxide (CO). In the course of our review of the project for these pollutants, several issues surfaced which you should be aware of.

a. On October 3, 1977, New Source Performance Standards (NSPS) were proposed for stationary gas turbines for SO₂ and NO_x. Since the PBU turbines will be installed after the date the NSPS limits were proposed, the project must comply with the NSPS limits in their final promulgated form. However, because the final NSPS limits for gas turbines have not been promulgated, there is a considerable amount of uncertainty as to what the limits will be. In our discussions with headquarters, the anticipated NSPS limits for SO₂ and NO_x for gas turbines used in the production or transportation of gas and oil are 150 ppm at 15 percent oxygen.

The anticipated NO_x limit for other new gas turbine installations over a specified size is 75 ppm at 15 percent oxygen based on the use of water injection as an NO_x control scheme. Even if the NO_x limit relaxation for turbines involved in the production and transport of oil or gas is not incorporated in the final NSPS promulgation, a strong argument can be made that water injection at Prudhoe Bay is not reasonable. Water is scarce in that region and elaborate methods would have to be employed during the winter to keep the water supply from freezing. An economic analysis indicates that if water injection were required, the capital costs of the project would increase by about a third as would the operation and maintenance costs. This expense does not appear to be worth the benefit in air quality derived from water injection.

b. The state of the art in oxidant modeling and the hydrocarbon/oxidant relationship is primitive at best. We do not yet have national guidance to assist us in determining whether or not an isolated but significant source of hydrocarbons would cause an oxidant violation. Several factors cloud the issue of the impact of the project on the oxidant standard (160 mg/m³, maximum 3 hour average between 6 AM and 9 AM):

1. The reactivity of the Prudhoe Bay hydrocarbon emissions may be significantly different than that inherent in the standard.
2. The diurnal sunlight pattern in Prudhoe Bay is drastically different from that in major U. S. urban areas (land of the midnight sun).
3. A lower maximum intensity of ultra violet radiation due to the low sun angles in Prudhoe Bay.
4. The Prudhoe Bay facilities emit substantial quantities of NO_x which can react with the hydrocarbons in the oxidant chain in an as yet undefined way.
5. The applicability of the suggested background value of reactive hydrocarbons (70mg/m³) is suspect. Many of the natural sources of reactive hydrocarbons which generated this background standard are not present at Prudhoe Bay. However, other natural sources may exist there that we are unaware of. This issue is further complicated by observations that rural oxidant levels in general are much higher than expected with no identified cause.

The maximum predicted 3-hour concentration is 42 mg/m^3 . Considering the above uncertainties, it is our conclusion that the 160 mg/m^3 standard will not be violated. If our conclusion were challenged, however, you should be aware that we would not have a solid foundation on which to base our defense. The technical analysis is based on the old oxidant standard of .08 ppm. While none of the above uncertainties are cleared up by relaxation of the standard (.12ppm or 240 mg/m^3) the possibility of violating the standard is even more remote.

c. The air quality analysis employs a "non-guideline" air quality model that we recommend be allowed. The Clean Air Act requires that the use of a "non-guideline" model be subject to public comment and a public hearing if requested. This is contained as part of the public notice advertising the preliminary determination.

d. Due to significant NO_x emissions, we expect that there will be visible plumes from these turbines at least part of the time. Water vapor produced from combustion will very likely condense in the colder winter months generating plumes which will be visible for some distance downwind. Because the plumes will be above ground for the most part, a ground level ice fog problem is not anticipated.

RECOMMENDATION

The emission limits indicated in the preliminary determination document reflect BACT. Construction of the project is not expected to cause violations of the national ambient air quality standards. There are no PSD increments for the pollutants of concern. The staff recommendation is that you sign the enclosed letters to Mr. Nelson and Mr. Norgaard and the Notice of Application to Construct and Preliminary Determination.